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JUL 26 2004
PATENT & TRADEMARK OFFICE

SEQUENCE LISTING

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<110>  Isis Pharmaceuticals, Inc.
       Crooke, Stanley T.
       Lima, Walter
       Wu, Hongjiang

<120>  Methods of Using Mammalian RNase H and Compositions Thereof

<130>  ISPH-0790

<150>  US 10/358,439
<151>  2003-02-03

<150>  US 09/992,738
<151>  2001-11-14

<150>  US 09/781,712
<151>  2001-02-12

<150>  US 09/861,205
<151>  2001-05-18

<150>  US 09/684,254
<151>  2000-10-06

<150>  US 09/343,809
<151>  1999-06-30

<150>  US 09/203,716
<151>  1998-12-02

<150>  US 60/067,458
<151>  1997-12-04

<150>  US 60/248,950
<151>  2000-11-15

<150>  US 60/497,412
<151>  2003-08-21

<160>  104

<170>  PatentIn version 3.2

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Pro Cys Arg Arg Gly Ser Arg Gly Phe Gly Met Phe Tyr Ala Val Arg
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Arg Gly Arg Lys Thr Gly Val Phe Leu Thr Trp Asn Glu Cys Arg Ala
        35                  40                  45


Gln Val Asp Arg Phe Pro Ala Ala Arg Phe Lys Lys Phe Ala Thr Glu
    50                  55                  60


Asp Glu Ala Trp Ala Phe Val Arg Lys Ser Ala Ser Pro Glu Val Ser
65                  70                  75                  80


Glu Gly His Glu Asn Gln His Gly Gln Glu Ser Glu Ala Lys Xaa Xaa
                85                  90                  95


Lys Arg Leu Arg Glu Pro Leu Asp Gly Asp Gly His Glu Ser Ala Xaa
            100                 105                 110


Pro Tyr Ala Lys His Met Lys Pro Ser Val Glu Pro Ala Pro Pro Val
        115                 120                 125


Ser Arg Asp Thr Phe Ser Tyr Met Gly Asp Phe Val Val Val Tyr Thr
    130                 135                 140


Asp Gly Cys Cys Ser Ser Asn Gly Arg Arg Xaa Pro Arg Ala Gly Ile
145                 150                 155                 160


Gly Val Tyr Trp Gly Pro Gly His Pro Leu Asn Val Gly Ile Arg Leu
                165                 170                 175


Pro Gly Arg Gln Thr Asn Gln Arg Ala Glu Ile His Ala Ala Cys Lys
            180                 185                 190


Ala Ile Glu Gln Ala Lys Thr Gln Asn Ile Asn Lys Leu Val Leu Tyr
        195                 200                 205


Thr Asp Ser Met Phe Thr Ile Asn Gly Ile Thr Asn Trp Val Gln Gly
    210                 215                 220
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Trp Lys Lys Asn Gly Trp Lys Thr Ser Ala Gly Lys Glu Val Ile Asn
225                 230                 235                 240

Lys Glu Asp Phe Val Ala Leu Glu Arg Leu Thr Gln Gly Met Asp Ile
                245                 250                 255

Gln Trp Met His Val Pro Gly His Ser Gly Phe Ile Gly Asn Glu Glu
            260                 265                 270

Ala Asp Arg Leu Ala Arg Glu Gly Ala Lys Gln Ser Glu Asp
        275                 280                 285


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<212>  PRT
<213>  Gallus gallus

<400>  2

Met Leu Arg Trp Leu Val Ala Leu Leu Ser His Ser Cys Phe Val Ser
1               5                   10                  15

Lys Gly Gly Gly Met Phe Tyr Ala Val Arg Lys Gly Arg Gln Thr Gly
            20                  25                  30

Val Tyr Arg Thr Trp Ala Glu Cys Gln Gln Gln Val Asn Arg Phe Pro
        35                  40                  45

Ser Ala Ser Phe Lys Lys Phe Ala Thr Glu Lys Glu Ala Trp Ala Phe
    50                  55                  60

Val Gly Ala Gly Pro Pro Asp Gly Gln Gln Ser Ala Pro Ala Glu Thr
65                  70                  75                  80

His Gly Ala Ser Ala Val Ala Gln Glu Asn Ala Ser His Arg Glu Glu
                85                  90                  95

Pro Glu Thr Asp Val Leu Cys Cys Asn Ala Cys Lys Arg Arg Tyr Glu
            100                 105                 110

Gln Ser Thr Asn Glu Glu His Thr Val Arg Arg Ala Lys His Asp Glu
        115                 120                 125

Glu Gln Ser Thr Pro Val Val Ser Glu Ala Lys Phe Ser Tyr Met Gly
    130                 135                 140
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Glu Phe Ala Val Val Tyr Thr Asp Gly Cys Cys Ser Gly Asn Gly Arg
145                 150                 155                 160

Asn Arg Ala Arg Ala Gly Ile Gly Val Tyr Trp Gly Pro Gly His Pro
                165                 170                 175

Leu Asn Ile Ser Glu Arg Leu Pro Gly Arg Gln Thr Asn Gln Arg Ala
            180                 185                 190

Glu Ile His Ala Ala Cys Lys Ala Ile Glu Gln Ala Lys Ser Gln Asn
        195                 200                 205

Ile Lys Lys Leu Ile Ile Tyr Thr Asp Ser Lys Phe Thr Ile Asn Gly
    210                 215                 220

Ile Thr Ser Trp Val Glu Asn Trp Lys Thr Asn Gly Trp Arg Thr Ser
225                 230                 235                 240

Ser Gly Gly Ser Val Ile Asn Lys Glu Asp Phe Gln Lys Leu Asp Ser
                245                 250                 255

Leu Ser Lys Gly Ile Glu Ile Gln Trp Met His Ile Pro Gly His Ala
            260                 265                 270

Gly Phe Gln Gly Asn Glu Glu Ala Asp Arg Leu Ala Arg Glu Gly Ala
        275                 280                 285

Ser Lys Gln Lys Leu
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Met Ala Arg Gln Gly Asn Phe Tyr Ala Val Arg Lys Gly Arg Glu Thr
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Gly Ile Tyr Asn Thr Trp Asn Glu Cys Lys Asn Gln Val Asp Gly Tyr
            20                  25                  30

Gly Gly Ala Ile Tyr Lys Lys Phe Asn Ser Tyr Glu Gln Ala Lys Ser
        35                  40                  45

Phe Leu Gly Gln Pro Asn Thr Thr Ser Asn Tyr Gly Ser Ser Thr His
    50                  55                  60
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Ala Gly Gly Gln Val Ser Lys Pro His Thr Thr Gln Lys Arg Val His
65                  70                  75                  80

Arg Arg Asn Arg Pro Leu His Tyr Ser Ser Leu Thr Ser Ser Ser Ala
                85                  90                  95

Cys Ser Ser Leu Ser Ser Ala Asn Thr Asn Thr Phe Tyr Ser Val Lys
            100                 105                 110

Ser Asn Val Pro Asn Ile Glu Ser Lys Ile Phe Asn Asn Trp Lys Asp
        115                 120                 125

Cys Gln Ala Tyr Val Lys His Lys Arg Gly Ile Thr Phe Lys Lys Phe
    130                 135                 140

Glu Asp Gln Leu Ala Ala Glu Asn Phe Ile Ser Gly Met Ser Ala His
145                 150                 155                 160

Asp Tyr Lys Leu Met Asn Ile Ser Lys Glu Ser Phe Glu Ser Lys Tyr
                165                 170                 175

Lys Leu Ser Ser Asn Thr Met Tyr Asn Lys Ser Met Asn Val Tyr Cys
            180                 185                 190

Asp Gly Ser Ser Phe Gly Asn Gly Thr Ser Ser Ser Arg Ala Gly Tyr
        195                 200                 205

Gly Ala Tyr Phe Glu Gly Ala Pro Glu Glu Asn Ile Ser Glu Pro Leu
    210                 215                 220

Leu Ser Gly Ala Gln Thr Asn Asn Arg Ala Glu Ile Glu Ala Val Ser
225                 230                 235                 240

Glu Ala Leu Lys Lys Ile Trp Glu Lys Leu Thr Asn Glu Lys Glu Lys
                245                 250                 255

Val Asn Tyr Gln Ile Lys Thr Asp Ser Glu Tyr Val Thr Lys Leu Leu
            260                 265                 270

Asn Asp Arg Tyr Met Thr Tyr Asp Asn Lys Lys Leu Glu Gly Leu Pro
        275                 280                 285

Asn Ser Asp Leu Ile Val Pro Leu Val Gln Arg Phe Val Lys Val Lys
    290                 295                 300
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Lys Tyr Tyr Glu Leu Asn Lys Glu Cys Phe Lys Asn Asn Gly Lys Phe
305                 310                 315                 320

Gln Ile Glu Trp Val Lys Gly His Asp Gly Asp Pro Gly Asn Glu Met
                325                 330                 335

Ala Asp Phe Leu Ala Lys Lys Gly Ala Ser Arg Arg
            340                 345


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<212>  PRT
<213>  E. coli

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Met Leu Lys Gln Val Glu Ile Phe Thr Asp Gly Ser Cys Leu Gly Asn
1               5                   10                  15

Pro Gly Pro Gly Gly Tyr Gly Ala Ile Leu Arg Tyr Arg Gly Arg Glu
            20                  25                  30

Lys Thr Phe Ser Ala Gly Tyr Thr Arg Thr Thr Asn Asn Arg Met Glu
        35                  40                  45

Leu Met Ala Ala Ile Val Ala Leu Glu Ala Leu Lys Glu His Cys Glu
    50                  55                  60

Val Ile Leu Ser Thr Asp Ser Gln Tyr Val Arg Gln Gly Ile Thr Gln
65                  70                  75                  80

Trp Ile His Asn Trp Lys Lys Arg Gly Trp Lys Thr Ala Asp Lys Lys
                85                  90                  95

Pro Val Lys Asn Val Asp Leu Trp Gln Arg Leu Asp Ala Ala Leu Gly
            100                 105                 110

Gln His Gln Ile Lys Trp Glu Trp Val Lys Gly His Ala Gly His Pro
        115                 120                 125

Glu Asn Glu Arg Cys Asp Glu Leu Ala Arg Ala Ala Ala Met Asn Pro
    130                 135                 140

Thr Leu Glu Asp Thr Gly Tyr Gln Val Glu Val
145                 150                 155


<210>  5
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<211>  216
<212>  PRT
<213>  Mus

<400>  5

Gly Ile Cys Gly Leu Gly Met Phe Tyr Ala Val Arg Arg Gly Arg Arg
1               5                   10                  15


Pro Gly Val Phe Leu Ser Trp Ser Glu Cys Lys Ala Gln Val Asp Arg
            20                  25                  30


Phe Pro Ala Ala Arg Phe Lys Lys Phe Ala Thr Glu Asp Glu Ala Trp
        35                  40                  45


Ala Phe Val Arg Ser Ser Ser Ser Pro Asp Gly Ser Lys Gly Gln Glu
    50                  55                  60


Ser Ala His Glu Gln Lys Ser Gln Ala Lys Thr Ser Lys Arg Pro Arg
65                  70                  75                  80


Glu Pro Leu Val Val Val Tyr Thr Asp Gly Cys Cys Ser Ser Asn Gly
                85                  90                  95


Arg Lys Arg Ala Arg Ala Gly Ile Gly Val Tyr Trp Gly Pro Gly His
            100                 105                 110


Pro Leu Asn Val Arg Ile Arg Leu Pro Gly Arg Gln Thr Asn Gln Arg
        115                 120                 125


Ala Glu Ile His Ala Ala Cys Lys Ala Val Met Gln Ala Lys Ala Gln
    130                 135                 140


Asn Ile Ser Lys Leu Val Leu Tyr Thr Asp Ser Met Phe Thr Ile Asn
145                 150                 155                 160


Gly Ile Thr Asn Trp Val Gln Gly Trp Lys Lys Asn Gly Trp Arg Thr
                165                 170                 175


Ser Thr Gly Lys Asp Val Ile Asn Lys Glu Asp Phe Met Glu Leu Asp
            180                 185                 190


Glu Leu Thr Gln Gly Met Asp Ile Gln Trp Met His Ile Pro Gly His
        195                 200                 205


Ser Gly Phe Val Gly Asn Glu Glu
    210                 215
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<210>  6
<211>  299
<212>  PRT
<213>  Homo sapiens

<400>  6

Met Asp Leu Ser Glu Leu Glu Arg Asp Asn Thr Gly Arg Cys Arg Leu
1               5                   10                  15


Ser Ser Pro Val Pro Ala Val Cys Arg Lys Glu Pro Cys Val Leu Gly
            20                  25                  30


Val Asp Glu Ala Gly Arg Gly Pro Val Leu Gly Pro Met Val Tyr Ala
        35                  40                  45


Ile Cys Tyr Cys Pro Leu Pro Arg Leu Ala Asp Leu Glu Ala Leu Lys
    50                  55                  60


Val Ala Asp Ser Lys Thr Leu Leu Glu Ser Glu Arg Glu Arg Leu Phe
65                  70                  75                  80


Ala Lys Met Glu Asp Thr Asp Phe Val Gly Trp Ala Leu Asp Val Leu
                85                  90                  95


Ser Pro Asn Leu Ile Ser Thr Ser Met Leu Gly Trp Val Lys Tyr Asn
            100                 105                 110


Leu Asn Ser Leu Ser His Asp Thr Ala Thr Gly Leu Ile Gln Tyr Ala
        115                 120                 125


Leu Asp Gln Gly Val Asn Val Thr Gln Val Phe Val Asp Thr Val Gly
    130                 135                 140


Met Pro Glu Thr Tyr Gln Ala Arg Leu Gln Gln Ser Phe Pro Gly Ile
145                 150                 155                 160


Glu Val Thr Val Lys Ala Lys Ala Asp Ala Leu Tyr Pro Val Val Ser
                165                 170                 175


Ala Ala Ser Ile Cys Ala Lys Val Ala Arg Asp Gln Ala Val Lys Lys
            180                 185                 190


Trp Gln Phe Val Glu Lys Leu Gln Asp Leu Asp Thr Asp Tyr Gly Ser
        195                 200                 205


Gly Tyr Pro Asn Asp Pro Lys Thr Lys Ala Trp Leu Lys Glu His Val
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    210                 215                 220

Glu Pro Val Phe Gly Phe Pro Gln Phe Val Arg Phe Ser Trp Arg Thr
225                 230                 235                 240

Ala Gln Thr Ile Leu Glu Lys Glu Ala Glu Asp Val Ile Trp Glu Asp
                245                 250                 255

Ser Ala Ser Glu Asn Gln Glu Gly Leu Arg Lys Ile Thr Ser Tyr Phe
            260                 265                 270

Leu Asn Glu Gly Ser Gln Ala Arg Pro Arg Ser Ser His Arg Tyr Phe
        275                 280                 285

Leu Glu Arg Gly Leu Glu Ser Ala Thr Ser Leu
    290                 295


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<212>  PRT
<213>  Mus sp.

<400>  7

Met Asp Leu Ser Glu Leu Glu Arg Asp Asn Thr Gly Arg Cys Arg Leu
1               5                   10                  15

Ser Ser Pro Val Pro Ala Val Cys Leu Lys Glu Pro Cys Val Leu Gly
            20                  25                  30

Val Asp Glu Ala Gly Arg Gly Pro Val Leu Gly Pro Met Val Tyr Ala
        35                  40                  45

Ile Cys Tyr Cys Pro Leu Ser Arg Leu Ala Asp Leu Glu Ala Leu Lys
    50                  55                  60

Val Ala Asp Ser Lys Thr Leu Thr Glu Asn Glu Arg Glu Arg Leu Phe
65                  70                  75                  80

Ala Lys Met Glu Glu Asp Gly Asp Phe Val Gly Trp Ala Leu Asp Val
                85                  90                  95

Leu Ser Pro Asn Leu Ile Ser Thr Ser Met Leu Gly Arg Val Lys Tyr
            100                 105                 110

Asn Leu Asn Ser Leu Ser His Asp Thr Ala Ala Gly Leu Ile Gln Tyr
        115                 120                 125
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<400>  8

Ser Lys Thr Val Lys Tyr Phe Ile Glu Arg Met Ser Leu Lys Cys Glu
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Thr Glu Arg Ser Lys Thr Trp Asn Asn Phe Gly Asn Gly Ile Pro Cys
            20                  25                  30

Val Leu Gly Ile Asp Glu Ala Gly Arg Gly Pro Val Leu Gly Pro Met
        35                  40                  45

Val Tyr Ala Ala Ala Ile Ser Pro Leu Asp Gln Asn Val Glu Leu Lys
    50                  55                  60

Asn Leu Gly Val Asp Asp Ser Lys Ala Leu Asn Glu Ala Lys Arg Glu
65                  70                  75                  80

Glu Ile Phe Asn Lys Met Asn Glu Asp Glu Asp Ile Gln Gln Ile Ile
                85                  90                  95

Ala Tyr Ala Leu Arg Cys Leu Ser Pro Glu Leu Ile Ser Cys Ser Met
            100                 105                 110

Leu Lys Arg Gln Lys Tyr Ser Leu Asn Glu Val Ser His Glu Ala Ala
        115                 120                 125

Ile Thr Leu Ile Arg Asp Ala Leu Ala Cys Asn Val Asn Val Val Glu
    130                 135                 140

Ile Lys Val Asp Thr Val Gly Pro Lys Ala Thr Tyr Gln Ala Lys Leu
145                 150                 155                 160

Glu Lys Leu Phe Pro Gly Ile Ser Ile Cys Val Thr Glu Lys Ala Asp
                165                 170                 175

Ser Leu Phe Pro Ile Val Ser Ala Ala Ser Ile Ala Ala Lys Val Thr
            180                 185                 190

Arg Asp Ser Arg Leu Arg Asn Trp Gln Phe Arg Glu Lys Asn Ile Lys
        195                 200                 205

Val Pro Asp Ala Gly Tyr Gly Ser Gly Tyr Pro Gly Asp Pro Asn Thr
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    210                 215                 220

Lys Lys Phe Leu Gln Leu Ser Val Glu Pro Val Phe Gly Phe Cys Ser
225                 230                 235                 240

Leu Val Arg Ser Ser Trp Lys Thr Ala Ser Thr Ile Val Glu Lys Arg
                245                 250                 255

Cys Val Pro Gly Ser Trp Glu Asp Asp Glu Glu Glu Gly Lys Ser Gln
            260                 265                 270

Ser Lys Arg Met Thr Ser Trp Met Val Pro Lys Asn Glu Thr Glu Val
        275                 280                 285

Val Pro Lys Arg Asn Met Glu Ile Asn Leu Thr Lys Ile Val Ser Thr
    290                 295                 300

Leu Phe Leu
305


<210>  9
<211>  307
<212>  PRT
<213>  Yeast

<400>  9

Met Val Pro Pro Thr Val Glu Ala Ser Leu Glu Ser Pro Tyr Thr Lys
1               5                   10                  15

Ser Tyr Phe Ser Pro Val Pro Ser Ala Leu Leu Glu Gln Asn Asp Ser
            20                  25                  30

Pro Ile Ile Met Gly Ile Asp Glu Ala Gly Arg Gly Pro Val Leu Gly
        35                  40                  45

Pro Met Val Tyr Ala Val Ala Tyr Ser Thr Gln Lys Tyr Gln Asp Glu
    50                  55                  60

Thr Ile Ile Pro Asn Tyr Glu Phe Asp Asp Ser Lys Lys Leu Thr Asp
65                  70                  75                  80

Pro Ile Arg Arg Met Leu Phe Ser Lys Ile Tyr Gln Asp Asn Glu Glu
                85                  90                  95

Leu Thr Gln Ile Gly Tyr Ala Thr Thr Cys Ile Thr Pro Leu Asp Ile
            100                 105                 110
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Ser Arg Gly Met Ser Lys Phe Pro Pro Thr Arg Asn Tyr Asn Leu Asn
115 120 125

Glu Gln Ala His Asp Val Thr Met Ala Leu Ile Asp Gly Val Ile Lys
130 135 140

Gln Asn Val Lys Leu Ser His Val Tyr Val Asp Thr Val Gly Pro Pro
145 150 155 160

Ala Ser Tyr Gln Lys Lys Leu Glu Gln Arg Phe Pro Gly Val Lys Phe
165 170 175

Thr Val Ala Lys Lys Ala Asp Ser Leu Tyr Cys Met Val Ser Val Ala
180 185 190

Ser Val Val Ala Lys Val Thr Arg Asp Ile Leu Val Glu Ser Leu Lys
195 200 205

Arg Asp Pro Asp Glu Ile Leu Gly Ser Gly Tyr Pro Ser Asp Pro Lys
210 215 220

Thr Val Ala Trp Leu Lys Arg Asn Gln Thr Ser Leu Met Gly Trp Pro
225 230 235 240

Ala Asn Met Val Arg Phe Ser Trp Gln Thr Cys Gln Thr Leu Leu Asp
245 250 255

Asp Ala Ser Lys Asn Ser Ile Pro Ile Lys Trp Glu Glu Gln Tyr Met
260 265 270

Asp Ser Arg Lys Asn Ala Ala Gln Lys Thr Lys Gln Leu Gln Leu Gln
275 280 285

Met Val Ala Lys Pro Val Arg Arg Lys Arg Leu Arg Thr Leu Asp Asn
290 295 300

Trp Tyr Arg
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<213> E.coli

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Glu Val Gly Arg Gly Pro Leu Val Gly Ala Val Val Thr Ala Ala Val
            20   25   30

Ile Leu Asp Pro Ala Arg Pro Ile Ala Gly Leu Asn Asp Ser Lys Lys
        35   40   45

Leu Ser Glu Lys Arg Arg Leu Ala Leu Tyr Glu Glu Ile Lys Glu Lys
    50   55   60

Ala Leu Ser Trp Ser Leu Gly Arg Ala Glu Pro His Glu Ile Asp Glu
65   70   75   80

Leu Asn Ile Leu His Ala Thr Met Leu Ala Met Gln Arg Ala Val Ala
                85   90   95

Gly Leu His Ile Ala Pro Glu Tyr Val Leu Ile Asp Gly Asn Arg Cys
            100   105   110

Pro Lys Leu Pro Met Pro Ala Met Ala Val Val Lys Gly Asp Ser Arg
        115   120   125

Val Pro Glu Ile Ser Ala Ala Ser Ile Leu Ala Lys Val Thr Arg Asp
    130   135   140

Ala Glu Met Ala Ala Leu Asp Ile Val Phe Pro Gln Tyr Gly Phe Ala
145   150   155   160

Gln His Lys Gly Tyr Pro Thr Ala Phe His Leu Glu Lys Leu Ala Glu
                165   170   175

His Gly Ala Thr Glu His His Arg Arg Ser Phe Gly Pro Val Lys Arg
            180   185   190

Ala Leu Gly Leu Ala Ser
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120

ccgcaaggag ccttgcgtcc tgggcgtcga tgaggcgggc aggggccccg tgctgggccc
180

catggtctac gccatctgtt attgtcccct gcctcgcctg gcagatctgg aggcgctgaa
240

agtggcagac tcaaagaccc tattggagag cgagcgggaa aggctgtttg cgaaaatgga
300

ggacacggac tttgtcggct gggcgctgga tgtgctgtct ccaaacctca tctctaccag
360

catgcttggg tgggtcaaat acaacctgaa ctccctgtca catgatacag ccactgggct
420

tatacagtat gcattggacc agggcgtgaa cgtcacccag gtattcgtgg acaccgtagg
480

gatgccagag acataccagg cgcggctgca gcaaagtttt cccgggattg aggtgacggt
540

caaggccaaa gcagatgccc tctacccggt ggttagtgct gccagcatct gtgccaaggt
600

ggcccgggac caggccgtga agaaatggca attcgtggag aaactgcagg acttggatac
660

tgattatggc tcaggctacc ccaatgatcc caagacaaaa gcgtggttga aggagcacgt
720

ggagcctgtg ttcggcttcc cccagtttgt ccggttcagc tggcgcacgg cccagaccat
780

cctggagaaa gaggcggaag atgttatatg ggaggactca gcatccgaga atcaggaggg
840

actcaggaag atcacatcct acttcctcaa tgaagggtcc caagcccgtc cccgttcttc
900

ccaccgatat ttcctggaac gcggcctgga gtcagcaacc agcctctagc agctgcctct
960

acgcgctcta cctgcttccc caacccagac attaaaattg tttaaggaga accacacgta
1020

ggggatgtac ttttgggaca gaagcaaggt gggagtgtgc tctgcagccg ggtccagcta
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<302>  Cloning, Expression and Mapping of Ribonucleases H of Human and
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<303>  Genomics
<304>  53
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<307>  1998-11

<400>  12

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Pro Cys Arg Arg Gly Ser Arg Gly Phe Gly Met Phe Tyr Ala Val Arg
            20                  25                  30


Arg Gly Arg Lys Thr Gly Val Phe Leu Thr Trp Asn Glu Cys Arg Ala
        35                  40                  45


Gln Val Asp Arg Phe Pro Ala Ala Arg Phe Lys Lys Phe Ala Thr Glu
    50                  55                  60


Asp Glu Ala Trp Ala Phe Val Arg Lys Ser Ala Ser Pro Glu Val Ser
65                  70                  75                  80


Glu Gly His Glu Asn Gln His Gly Gln Glu Ser Glu Ala Lys Ala Ser
                85                  90                  95


Lys Arg Leu Arg Glu Pro Leu Asp Gly Asp Gly His Glu Ser Ala Glu
            100                 105                 110


Pro Tyr Ala Lys His Met Lys Pro Ser Val Glu Pro Ala Pro Pro Val
        115                 120                 125


Ser Arg Asp Thr Phe Ser Tyr Met Gly Asp Phe Val Val Val Tyr Thr
    130                 135                 140


Asp Gly Cys Cys Ser Ser Asn Gly Arg Arg Arg Pro Arg Ala Gly Ile
145                 150                 155                 160


Gly Val Tyr Trp Gly Pro Gly His Pro Leu Asn Val Gly Ile Arg Leu
                165                 170                 175


Pro Gly Arg Gln Thr Asn Gln Arg Ala Glu Ile His Ala Ala Cys Lys
            180                 185                 190


Ala Ile Glu Gln Ala Lys Thr Gln Asn Ile Asn Lys Leu Val Leu Tyr
        195                 200                 205
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Thr Asp Ser Met Phe Thr Ile Asn Gly Ile Thr Asn Trp Val Gln Gly
    210                 215                 220

Trp Lys Lys Asn Gly Trp Lys Thr Ser Ala Gly Lys Glu Val Ile Asn
225                 230                 235                 240

Lys Glu Asp Phe Val Ala Leu Glu Arg Leu Thr Gln Gly Met Asp Ile
                245                 250                 255

Gln Trp Met His Val Pro Gly His Ser Gly Phe Ile Gly Asn Glu Glu
            260                 265                 270

Ala Asp Arg Leu Ala Arg Glu Gly Ala Lys Gln Ser Glu Asp
        275                 280                 285
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<210> 13
<211> 286
<212> PRT
<213> Homo sapiens

<300>
<301> Frank, Braunshofer-Reiter, Poltl and Holzmann
<302> Cloning, Subcellular Localization and Functional Expression of Human RNAse HII
<303> Biol. Chem
<304> 379
<305> 99
<306> 1407-1412
<307> 1998-12

<400> 13

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Met Ser Trp Leu Leu Phe Leu Ala His Arg Val Ala Leu Ala Ala Leu
1               5                   10                  15

Pro Cys Arg Arg Gly Ser Arg Gly Phe Gly Met Phe Tyr Ala Val Arg
            20                  25                  30

Arg Gly Arg Lys Thr Gly Val Phe Leu Thr Trp Asn Glu Cys Arg Ala
        35                  40                  45

Gln Val Asp Arg Phe Pro Ala Ala Arg Phe Lys Lys Phe Ala Thr Glu
    50                  55                  60

Asp Glu Ala Trp Ala Phe Val Arg Lys Ser Ala Ser Pro Glu Val Ser
65                  70                  75                  80

Glu Gly His Glu Asn Gln His Gly Arg Glu Ser Glu Ala Lys Ala Ser
                85                  90                  95
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Lys Arg Leu Arg Glu Pro Leu Asp Gly Asp Gly His Glu Ser Ala Glu
            100                 105                 110

Pro Tyr Ala Lys His Met Lys Pro Ser Val Glu Pro Ala Pro Pro Val
        115                 120                 125

Ser Arg Asp Thr Phe Ser Tyr Met Gly Asp Phe Val Val Val Tyr Thr
    130                 135                 140

Asp Gly Cys Cys Ser Ser Asn Gly Arg Arg Arg Pro Arg Ala Gly Ile
145                 150                 155                 160

Gly Val Tyr Trp Gly Pro Gly His Pro Leu Asn Val Gly Ile Arg Leu
                165                 170                 175

Pro Gly Arg Gln Thr Asn Gln Arg Ala Glu Ile His Ala Ala Cys Lys
            180                 185                 190

Ala Ile Glu Gln Ala Lys Thr Gln Asn Ile Asn Lys Leu Val Leu Tyr
        195                 200                 205

Thr Asp Ser Met Phe Thr Ile Asn Gly Ile Thr Asn Trp Val Arg Gly
    210                 215                 220

Trp Lys Lys Asn Gly Trp Lys Thr Ser Ala Gly Lys Glu Val Ile Asn
225                 230                 235                 240

Lys Glu Asp Phe Val Ala Leu Glu Arg Leu Thr Gln Gly Met Asp Ile
                245                 250                 255

Gln Trp Met His Val Pro Gly His Ser Gly Phe Ile Gly Asn Glu Glu
            260                 265                 270

Ala Asp Arg Leu Ala Arg Glu Gly Ala Lys Gln Ser Glu Asp
        275                 280                 285


<210>  14
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<301>  Cerritelli and Crouch
<302>  Cloning, Expression and Mapping of Ribonucleases H of Human and
       Mouse Related to Bacterial RNase HI
<303>  Genomics
<304>  53
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<305>  3
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<307>  1998-11

<400>  14

Met Arg Trp Leu Leu Pro Leu Ser Arg Thr Val Thr Leu Ala Val Val
1               5                   10                  15


Arg Leu Arg Arg Gly Ile Cys Gly Leu Gly Met Phe Tyr Ala Val Arg
            20                  25                  30


Arg Gly Arg Arg Thr Gly Val Phe Leu Ser Trp Ser Glu Cys Lys Ala
        35                  40                  45


Gln Val Asp Arg Phe Pro Ala Ala Arg Phe Lys Lys Phe Ala Thr Glu
    50                  55                  60


Asp Glu Ala Trp Ala Phe Val Arg Ser Ser Ser Ser Pro Asp Gly Ser
65                  70                  75                  80


Lys Gly Gln Glu Ser Ala His Glu Gln Lys Ser Gln Ala Lys Thr Ser
                85                  90                  95


Lys Arg Pro Arg Glu Pro Leu Gly Glu Gly Glu Glu Leu Pro Glu Pro
            100                 105                 110


Gly Pro Lys His Thr Arg Gln Asp Thr Glu Pro Ala Ala Val Val Ser
        115                 120                 125


Lys Asp Thr Phe Ser Tyr Met Gly Glu Ser Val Ile Val Tyr Thr Asp
    130                 135                 140


Gly Cys Cys Ser Ser Asn Gly Arg Lys Arg Ala Arg Ala Gly Ile Gly
145                 150                 155                 160


Val Tyr Trp Gly Pro Gly His Pro Leu Asn Val Gly Ile Arg Leu Pro
                165                 170                 175


Gly Arg Gln Thr Asn Gln Arg Ala Glu Ile His Ala Ala Cys Lys Ala
            180                 185                 190


Ile Met Gln Ala Lys Ala Gln Asn Ile Ser Lys Leu Val Leu Tyr Thr
        195                 200                 205


Asp Ser Met Phe Thr Ile Asn Gly Ile Thr Asn Trp Val Gln Gly Trp
    210                 215                 220
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Lys Lys Asn Gly Trp Arg Thr Ser Thr Gly Lys Asp Val Ile Asn Lys
225                 230                 235                 240


Glu Asp Phe Met Glu Leu Asp Glu Leu Thr Gln Gly Met Asp Ile Gln
                245                 250                 255


Trp Met His Ile Pro Gly His Ser Gly Phe Val Gly Asn Glu Glu Ala
            260                 265                 270


Asp Arg Leu Ala Arg Glu Gly Ala Lys Gln Ser Glu Asp
        275                 280                 285


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<301>  Frank, Braunshofer-Reiter, Wintersberger, Grimm and Busen
<302>  Cloning of the cDNA encoding the large subunit of human RNAse
HI,
        a homologue of the prokaryotic RNAse HII
<303>  Proc. Natl. Acad. Sci. USA
<304>  95
<305>  22
<306>  12872-12877
<307>  1998-10-27

<400>  15

Met Asp Leu Ser Glu Leu Glu Arg Asp Asn Thr Gly Arg Cys Arg Leu
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Ser Ser Pro Val Pro Ala Val Cys Arg Lys Glu Pro Cys Val Leu Gly
            20                  25                  30


Val Asp Glu Ala Gly Arg Gly Pro Val Leu Gly Pro Met Val Tyr Ala
        35                  40                  45


Ile Cys Tyr Cys Pro Leu Pro Arg Leu Ala Asp Leu Glu Ala Leu Lys
    50                  55                  60


Val Ala Asp Ser Lys Thr Leu Leu Glu Ser Glu Arg Glu Arg Leu Phe
65                  70                  75                  80


Ala Lys Met Glu Asp Thr Asp Phe Val Gly Trp Ala Leu Asp Val Leu
                85                  90                  95


Ser Pro Asn Leu Ile Ser Thr Ser Met Leu Gly Arg Val Lys Tyr Asn
            100                 105                 110
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Leu Asn Ser Leu Ser His Asp Thr Ala Thr Gly Leu Ile Gln Tyr Ala
115 120 125

Leu Asp Gln Gly Val Asn Val Thr Gln Val Phe Val Asp Thr Val Gly
130 135 140

Met Pro Glu Thr Tyr Gln Ala Gln Leu Gln Gln Ser Phe Pro Gly Ile
145 150 155 160

Glu Val Thr Val Lys Ala Lys Ala Asp Ala Leu Tyr Pro Val Val Ser
165 170 175

Ala Ala Ser Ile Cys Ala Lys Val Ala Arg Asp Gln Ala Val Lys Lys
180 185 190

Trp Gln Phe Val Glu Lys Leu Gln Asp Leu Asp Thr Asp Tyr Gly Ser
195 200 205

Gly Tyr Pro Asn Asp Pro Lys Thr Lys Ala Trp Leu Lys Glu His Val
210 215 220

Glu Pro Val Phe Gly Phe Pro Gln Phe Val Arg Phe Ser Trp Arg Thr
225 230 235 240

Ala Gln Thr Ile Leu Glu Lys Glu Ala Glu Asp Val Ile Trp Glu Asp
245 250 255

Ser Ala Ser Glu Asn Gln Glu Gly Leu Arg Lys Ile Thr Ser Tyr Phe
260 265 270

Leu Asn Glu Gly Ser Gln Ala Arg Pro Arg Ser Ser His Arg Tyr Phe
275 280 285

Leu Glu Arg Gly Leu Glu Ser Ala Thr Ser
290 295

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28

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17

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cccgctcctg cagtattagt tcttgc
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<220>
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tccaataggg tctttgagtc tgccac
26

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25

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gcgaggcagg ggacaataac agatgg
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1               5                   10                  15


Ala Thr Glu Asp
            20


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<400>  50

Cys Lys Thr Ser Ala Gly Lys Glu Val Ile Asn Lys Glu Asp Phe Val
1               5                   10                  15


Ala Leu Glu Arg
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<220>
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<400>  51
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17


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<220>
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<220>
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aaactgctga actattgtag gagagatg
28


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<400>  56
agatgccgtg tttgatggct ccagc
25


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aatggctaag tgaagatgac aatcat
26


<210>  58
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<220>
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agcagtcttg atgcctcgac ggga
24

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24

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cccgttcttc ccaccgata
19

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caacgtctgg tatgatcctt caga
24

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gtgctccctc tcatctaact gctt
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23

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120

gccgccttgc cctgccgccg cggctctcgc gggttcggga tgttctatgc cgtgaggagg
180

ggccgcaaga ccggggtctt tctgacctgg aatgagtgca gagcacaggt ggaccggttt
240

cctgctgcca gatttaagaa gtttgccaca gaggatgagg cctgggcctt tgtcaggaaa
300

tctgcaagcc cggaagtttc agaagggcat gaaaatcaac atggacaaga atcggaggcg
360

aaagccagca agcgactccg tgagccactg gatggagatg gacatgaaag cgcagagccg
420

tatgcaaagc acatgaagcc gagcgtggag ccggcgcctc cagttagcag agacacgttt
480

tcctacatgg gagacttcgt cgtcgtctac actgatggct gctgctccag taatgggcgt
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agaaggccgc gagcaggaat cggcgtttac tggggggccag gccatccttt aaatgtaggc
600

attagacttc ctgggcggca gacaaaccaa agagcggaaa ttcatgcagc ctgcaaagcc
660

attgaacaag caaagactca aaacatcaat aaactggttc tgtatacaga cagtatgttt
720

acgataaatg gtataactaa ctgggttcaa ggttggaaga aaaatgggtg gaagacaagt
780

gcagggaaag aggtgatcaa caaagaggac tttgtggcac tggagaggct tacccagggg
840

atggacattc agtggatgca tgttcctggt cattcgggat ttataggcaa tgaagaagct
900

gacagattag ccagagaagg agctaaacaa tcggaagact gagccatgtg actttagtcc
960

ttgggagaac ttgagccagc ggctgtcttg ctgcctgtac ttactggtgt ggaaaatagc
1020

ctgcaggtag gaccattgca gtgatgggca gatgcgtctt tcacacggaa tcaggcacag
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<210> 103
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<220>
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